

### GenX3™ 1200V IGBTs

### IXGK82N120B3 IXGX82N120B3

$$V_{CES} = 1200V$$

$$I_{C110} = 82A$$

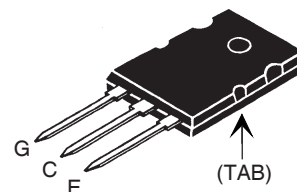
$$V_{CE(sat)} \leq 3.20V$$

High-Speed Low-Vsat PT IGBTs  
for 3 - 20 kHz Switching

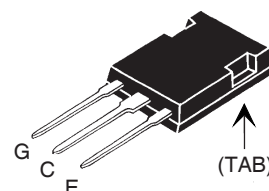


| Symbol                        | Test Conditions   | Maximum Ratings                         |            |
|-------------------------------|---|---|------------|
| $V_{CES}$                     | $T_J = 25^\circ C$ to $150^\circ C$   | 1200                                    | V          |
| $V_{CGR}$                     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$                           | 1200                                    | V          |
| $V_{GES}$                     | Continuous  | $\pm 20$                                | V          |
| $V_{GEM}$                     | Transient   | $\pm 30$                                | V          |
| $I_{C25}$                     | $T_C = 25^\circ C$ ( Chip Capability )  | 230                                     | A          |
| $I_{C110}$                    | $T_C = 110^\circ C$   | 82                                      | A          |
| $I_{LRMS}$                    | $T_C = 25^\circ C$ ( Lead RMS Limit )   | 120                                     | A          |
| $I_{CM}$                      | $T_C = 25^\circ C$ , 1ms  | 500                                     | A          |
| $I_A$                         | $T_C = 25^\circ C$  | 41                                      | A          |
| $E_{AS}$                      | $T_C = 25^\circ C$  | 750                                     | mJ         |
| <b>SSOA</b><br><b>(RBSOA)</b> | $V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 2\Omega$<br>Clamped Inductive Load | $I_{CM} = 164$<br>$V_{CE} \leq V_{CES}$ | A          |
| $P_C$                         | $T_C = 25^\circ C$  | 1250                                    | W          |
| $T_J$                         |   | -55 ... +150                            | $^\circ C$ |
| $T_{JM}$                      |   | 150                                     | $^\circ C$ |
| $T_{stg}$                     |   | -55 ... +150                            | $^\circ C$ |
| $T_L$                         | Maximum Lead Temperature for Soldering  | 300                                     | $^\circ C$ |
| $T_{SOLD}$                    | 1.6 mm (0.062 in.) from Case for 10   | 260                                     | $^\circ C$ |
| $M_d$                         | Mounting Torque ( IXGK )  | 1.13/10                                 | Nm/lb.in.  |
| $F_c$                         | Mounting Force ( IXGX )   | 20..120/4.5..14.6                       | N/lb.      |
| <b>Weight</b>                 | TO-264  | 10                                      | g          |
|                               | PLUS247   | 6                                       | g          |

#### TO-264 (IXGK)



#### PLUS247™ (IXGX)



G = Gate                      E = Emitter  
C = Collector                TAB = Collector

#### Features

- Optimized for Low Conduction and Switching Losses
- Square RBSOA
- High Avalanche Capability
- International Standard Packages

#### Advantages

- High Power Density
- Low Gate Drive Requirement

#### Applications

- Power Inverters
- UPS
- SMPS
- PFC Circuits
- Welding Machines
- Lamp Ballasts

| Symbol        | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|---------------|---|-----------------------|------|--------------------|
|               |   | Min.                  | Typ. | Max.               |
| $BV_{CES}$    | $I_C = 250\mu A$ , $V_{CE} = 0V$                                      | 1200                  |      | V                  |
| $V_{GE(th)}$  | $I_C = 1mA$ , $V_{CE} = V_{GE}$                                       | 3.0                   |      | 5.0 V              |
| $I_{CES}$     | $V_{CE} = V_{CES}$ , $V_{GE} = 0V$<br>$T_J = 125^\circ C$ , Note 1    |                       |      | 50 $\mu A$<br>5 mA |
| $I_{GES}$     | $V_{CE} = 0V$ , $V_{GE} = \pm 20V$                                    |                       |      | $\pm 100$ nA       |
| $V_{CE(sat)}$ | $I_C = I_{C110}$ , $V_{GE} = 15V$ , Note 2<br>$T_J = 125^\circ C$     | 2.70<br>2.64          |      | 3.20 V<br>V        |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)              | Characteristic Values |      |                    |    |
|--------------|--|-----------------------|------|--------------------|----|
|              |  | Min.                  | Typ. | Max.               |    |
| $g_{fs}$     | $I_C = 60\text{A}, V_{CE} = 10\text{V}$ , Note 2   | 35                    | 60   | S                  |    |
| $C_{ies}$    | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{ MHz}$                              |                       | 7900 | pF                 |    |
| $C_{oes}$    |  |                       | 640  | pF                 |    |
| $C_{res}$    |  |                       | 170  | pF                 |    |
| $Q_{g(on)}$  | $I_C = I_{C110}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$                        |                       | 350  | nC                 |    |
| $Q_{ge}$     |  |                       | 50   | nC                 |    |
| $Q_{gc}$     |  |                       | 150  | nC                 |    |
| $t_{d(on)}$  | Inductive load, $T_J = 25^\circ\text{C}$<br>$I_C = 80\text{A}, V_{GE} = 15\text{V}$      |                       | 30   | ns                 |    |
| $t_{ri}$     |  |                       | 77   | ns                 |    |
| $E_{on}$     |  |                       | 5.0  | mJ                 |    |
| $t_{d(off)}$ | Inductive load, $T_J = 25^\circ\text{C}$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$  |                       | 210  | ns                 |    |
| $t_{fi}$     |  | Note 3                | 100  | 180                | ns |
| $E_{off}$    |  |                       | 3.3  | 6.2                | mJ |
| $t_{d(on)}$  | Inductive load, $T_J = 125^\circ\text{C}$<br>$I_C = 80\text{A}, V_{GE} = 15\text{V}$     |                       | 32   | ns                 |    |
| $t_{ri}$     |  |                       | 80   | ns                 |    |
| $E_{on}$     |  |                       | 6.8  | mJ                 |    |
| $t_{d(off)}$ | Inductive load, $T_J = 125^\circ\text{C}$<br>$V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$ |                       | 240  | ns                 |    |
| $t_{fi}$     |  | Note 3                | 520  | ns                 |    |
| $E_{off}$    |  |                       | 7.1  | mJ                 |    |
| $R_{thJC}$   |  |                       | 0.10 | $^\circ\text{C/W}$ |    |
| $R_{thCK}$   |  |                       | 0.15 | $^\circ\text{C/W}$ |    |

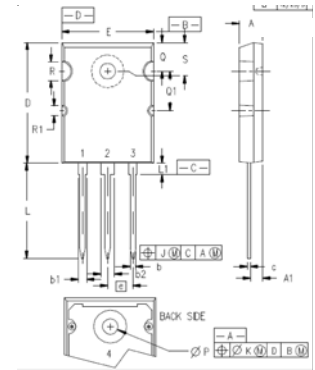
**Notes:**

1. Part must be heatsunk for high-temp  $I_{ces}$  measurement.
2. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .
3. Switching times & energy losses may increase for higher  $V_{CE}(\text{Clamp})$ ,  $T_J$  or  $R_G$ .

### ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

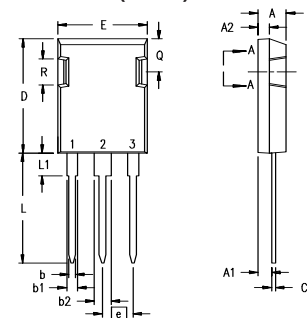
### TO-264 (IXGK) Outline



- 1 - GATE  
2, 4 - DRAIN (COLLECTOR)  
3 - SOURCE (EMITTER)

| SYM | INCHES  |       | MILLIMETERS |       |
|-----|---------|-------|-------------|-------|
|     | MIN     | MAX   | MIN         | MAX   |
| A   | .185    | .209  | 4.70        | 5.31  |
| A1  | .102    | .118  | 2.59        | 3.00  |
| b   | .037    | .055  | 0.94        | 1.40  |
| b1  | .087    | .102  | 2.21        | 2.59  |
| b2  | .110    | .126  | 2.79        | 3.20  |
| c   | .017    | .029  | 0.43        | 0.74  |
| D   | 1.007   | 1.047 | 25.58       | 26.59 |
| E   | .760    | .799  | 19.30       | 20.29 |
| e   | .215BSC |       | 5.46 BSC    |       |
| J   | .000    | .010  | 0.00        | 0.25  |
| K   | .000    | .010  | 0.00        | 0.25  |
| L   | .779    | .842  | 19.79       | 21.39 |
| L1  | .087    | .102  | 2.21        | 2.59  |
| ØP  | .122    | .138  | 3.10        | 3.51  |
| Q   | .240    | .256  | 6.10        | 6.50  |
| Q1  | .330    | .346  | 8.38        | 8.79  |
| ØR  | .155    | .187  | 3.94        | 4.75  |
| ØR1 | .085    | .093  | 2.16        | 2.36  |
| S   | .243    | .253  | 6.17        | 6.43  |

### PLUS247™ (IXGX) Outline



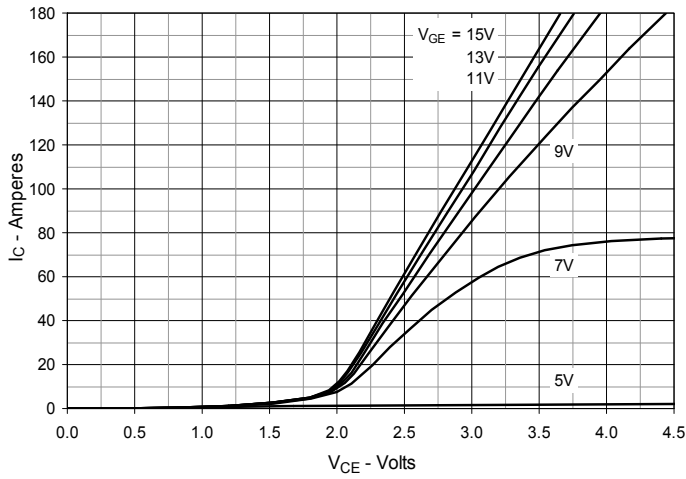
- Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)

| Dim.           | Millimeter |       | Inches   |       |
|----------------|------------|-------|----------|-------|
|                | Min.       | Max.  | Min.     | Max.  |
| A              | 4.83       | 5.21  | .190     | .205  |
| A <sub>1</sub> | 2.29       | 2.54  | .090     | .100  |
| A <sub>2</sub> | 1.91       | 2.16  | .075     | .085  |
| b              | 1.14       | 1.40  | .045     | .055  |
| b <sub>1</sub> | 1.91       | 2.13  | .075     | .084  |
| b <sub>2</sub> | 2.92       | 3.12  | .115     | .123  |
| C              | 0.61       | 0.80  | .024     | .031  |
| D              | 20.80      | 21.34 | .819     | .840  |
| E              | 15.75      | 16.13 | .620     | .635  |
| e              | 5.45 BSC   |       | .215 BSC |       |
| L              | 19.81      | 20.32 | .780     | .800  |
| L1             | 3.81       | 4.32  | .150     | .170  |
| Q              | 5.59       | 6.20  | .220     | 0.244 |
| R              | 4.32       | 4.83  | .170     | .190  |

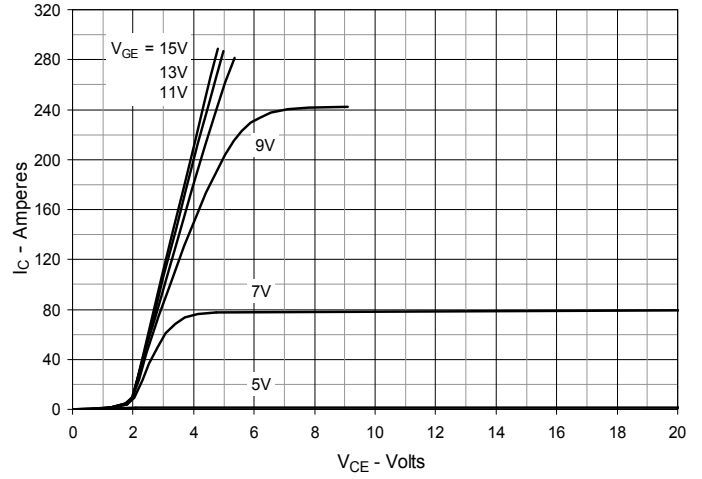
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338B2 |
|  | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |             |
|  | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |             |

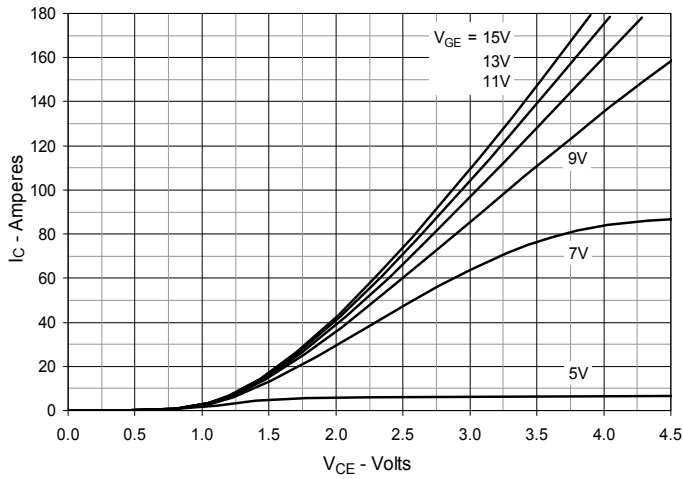
**Fig. 1. Output Characteristics @ 25°C**



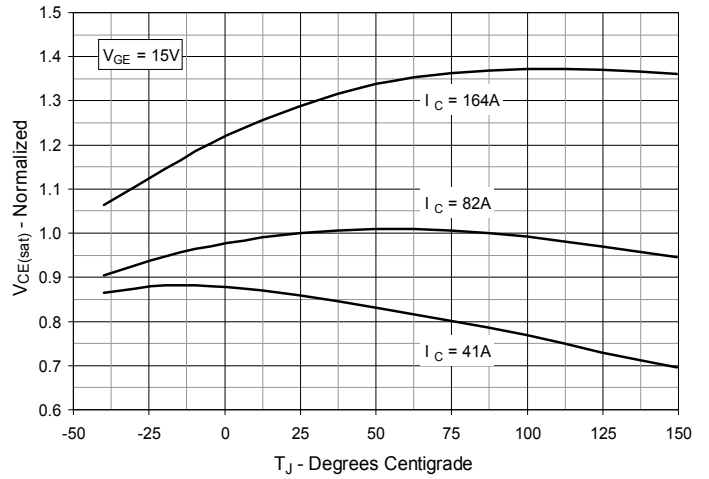
**Fig. 2. Extended Output Characteristics @ 25°C**



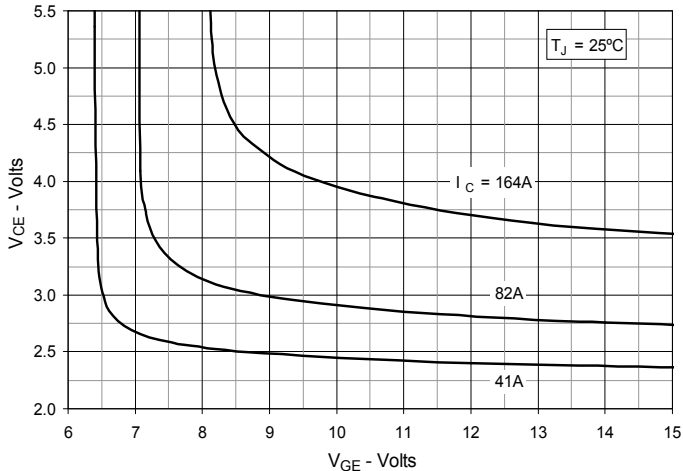
**Fig. 3. Output Characteristics @ 125°C**



**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



**Fig. 6. Input Admittance**

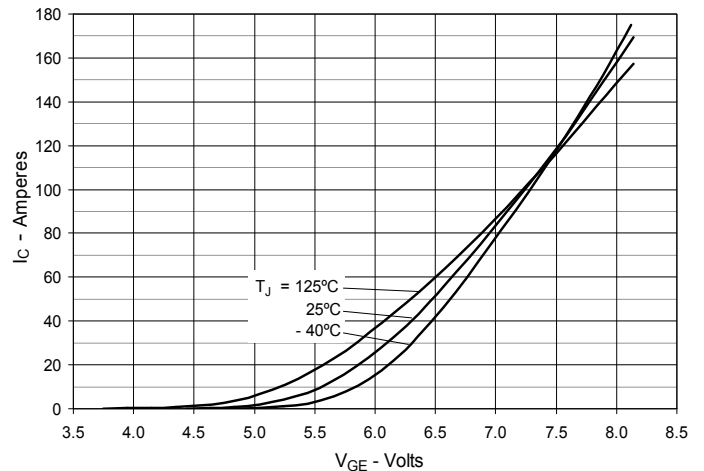


Fig. 7. Transconductance

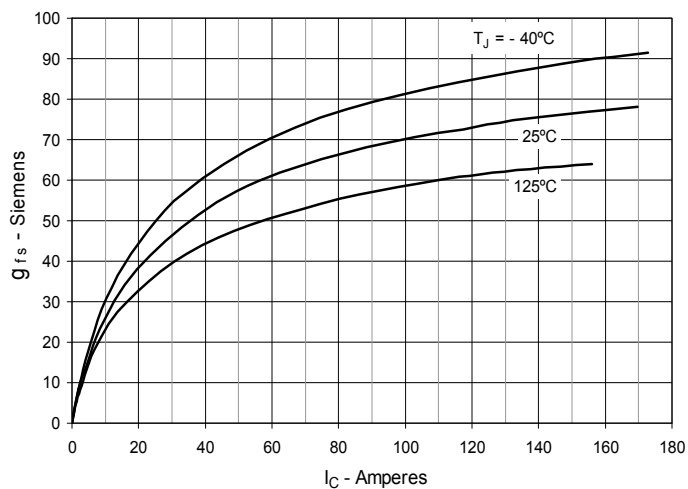


Fig. 8. Gate Charge

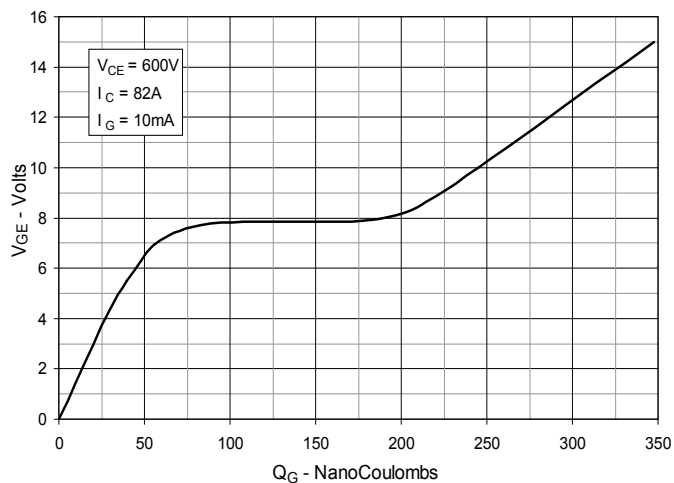


Fig. 9. Capacitance

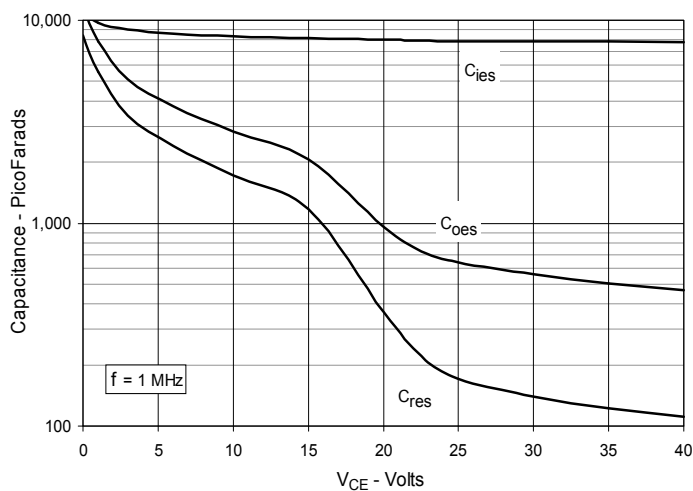


Fig. 10. Reverse-Bias Safe Operating Area

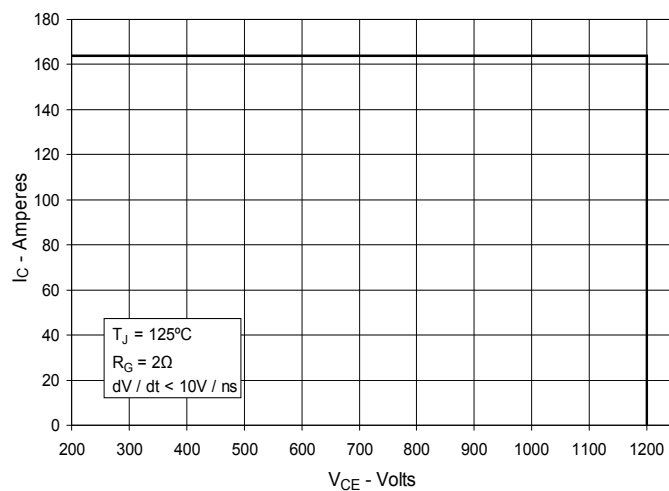
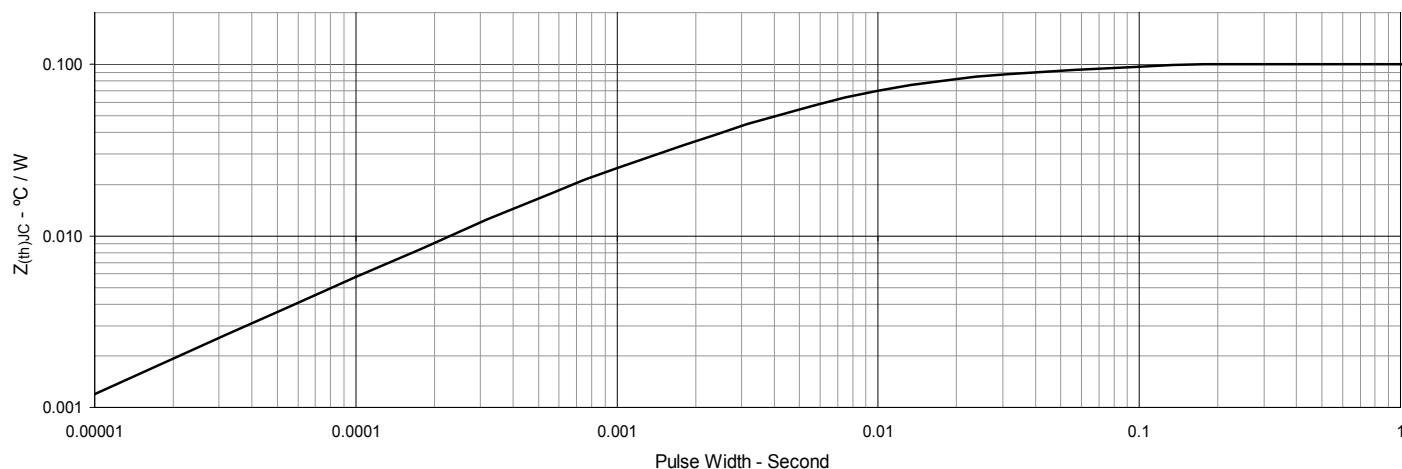
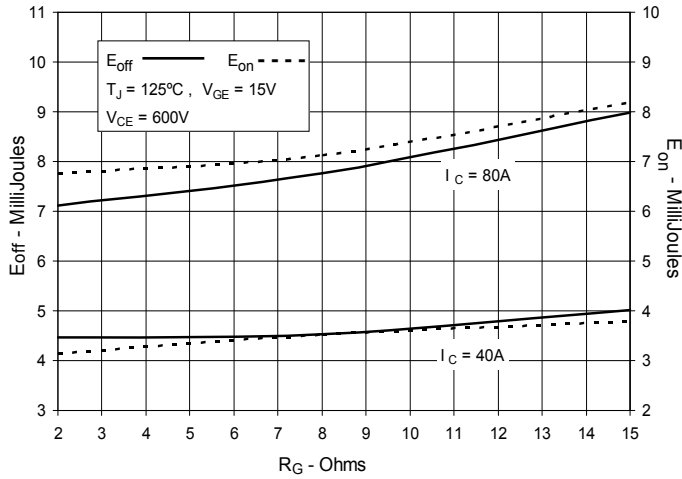


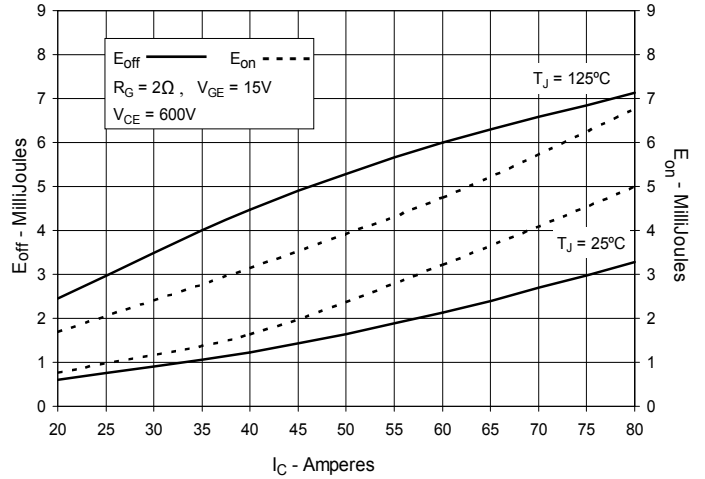
Fig. 11. Maximum Transient Thermal Impedance



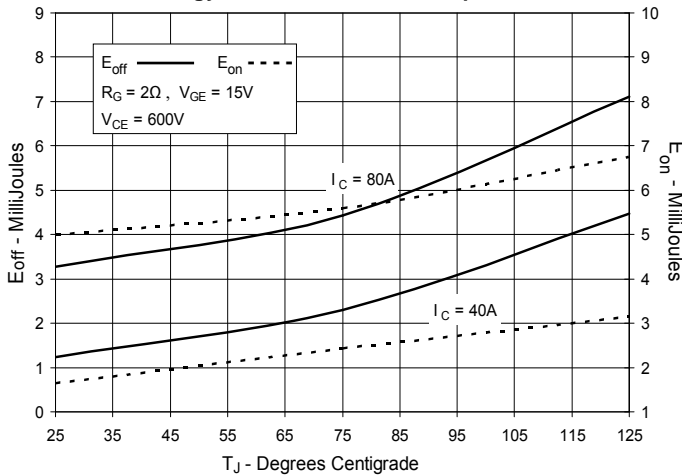
**Fig. 12. Inductive Switching  
Energy Loss vs. Gate Resistance**



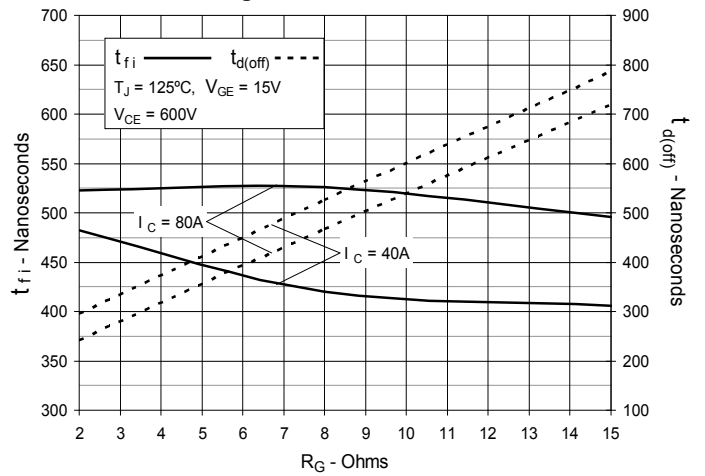
**Fig. 13. Inductive Switching  
Energy Loss vs. Collector Current**



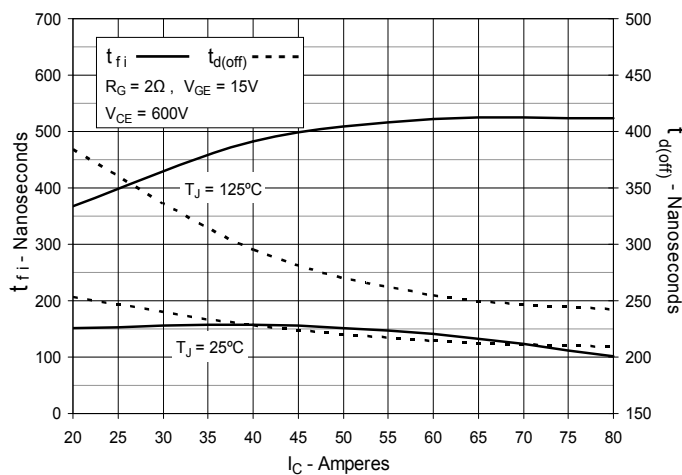
**Fig. 14. Inductive Switching  
Energy Loss vs. Junction Temperature**



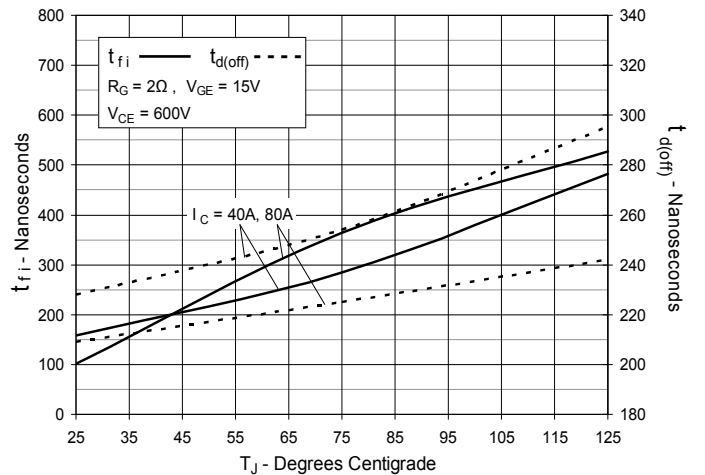
**Fig. 15. Inductive Turn-off  
Switching Times vs. Gate Resistance**



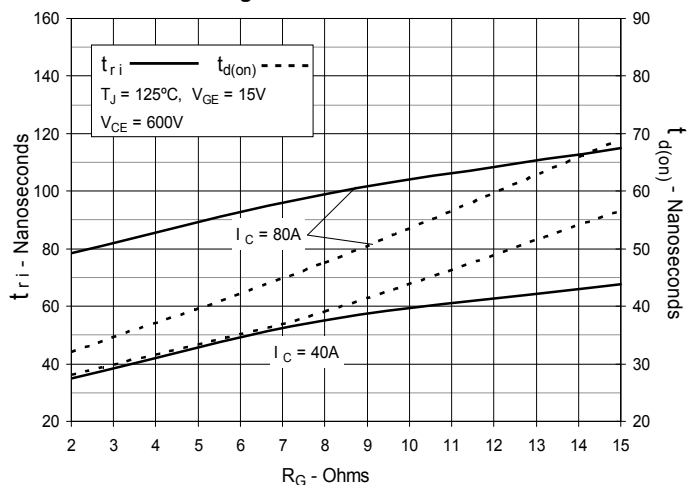
**Fig. 16. Inductive Turn-off  
Switching Times vs. Collector Current**



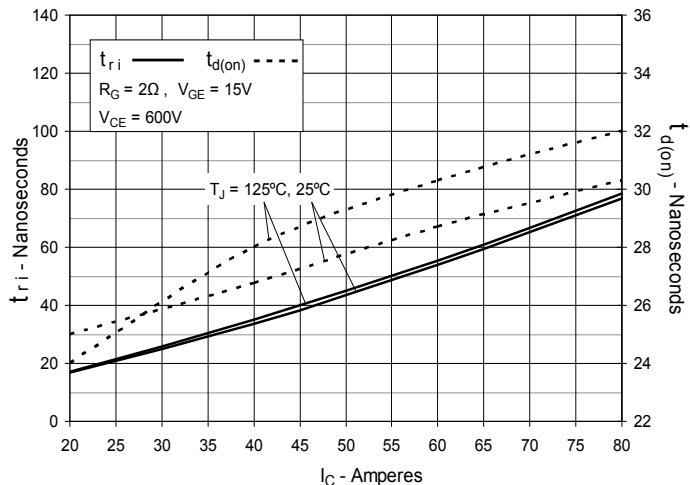
**Fig. 17. Inductive Turn-off  
Switching Times vs. Junction Temperature**



**Fig. 18. Inductive Turn-on  
Switching Times vs. Gate Resistance**



**Fig. 19. Inductive Turn-on  
Switching Times vs. Collector Current**



**Fig. 20. Inductive Turn-on  
Switching Times vs. Junction Temperature**

